REMARKS

In the Office Action mailed September 11, 2007, the Examiner took the following action: (1) rejected claims 1-72 under 35 USC §102(b) as being anticipated by Pado et al (U.S. 6,185,470 ("Pado" hereinafter). Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the following remarks.

I. 35 USC § 102(b)

Claims 1, 23-25, 47-49, 71, and 72 recite in part:

> "tuning a cost function . . . comprising . . . iteratively applying a control input signal from a range of known signals, wherein the control input signal *is generated using a signal generator* . . ." (emphasis added).

Regarding this claim element, the Office Action at page 3, states "iteratively applying a control input signal from a range of known signals, wherein the control input signal is generated using a signal generator (Pado, c4:36-57; EN signal generator is block 24). However, Pado at column 4, lines 36-60 discloses:

> Conventional use of neural networks to model future system states involves feeding one predicted state output at each instance of time back into the neural network and then predicts another state output for the next instance in time. Such a recursive method of predicting future states, however, tends to increase prediction time and compound the error from each prediction with each iteration until the prediction itself becomes meaningless. In contrast, the architecture of neural network 18 according to the present invention provides a parallel processing arrangement including a future state prediction horizon for efficient computation without compounding errors. By using neural network 18 to model plant 12, system 10 may be applied to a wide variety of complex, nonlinear systems and is particularly well suited for active flutter suppression, buffet load alleviation, or any vibration suppession system.

> Referring again to FIG. 1, system 10 first trains the neural network plant model 18 for use within its predictive control framework. System 10 receives sensor feedback y(n) from plant 12, digitizes it and then feeds it via line 32 into the inputs of neural network 18. The sensor output y(n) represents past state information and passes through a digital tapped-delay-line. In this embodiment, system 10 implements the tapped-delay-line in software with a stack, or array, of m past values of y(n) over the past m time steps.

As illustrated above, Block 24 is not described in the section of Pado cited in the Office Action. Applicants note that Pado at column 4, lines 60-62 discloses:

> As shown in FIG. 1, a block 24 labeled z^{-1} represents a memory for the development of the plant output history.

As can be seen from the foregoing, the Examiner-identified portions of Pado do *__not recite__* the signal generator as recited in Independent Claim 1. For example, claim 1 recites "iteratively applying a control input signal from a range of known signals, wherein the control input signal is generated using a signal generator."

Applicant has reviewed the Examiner-cited portions of Pado and is unable to locate a recitation of the signal generator of Claim 1. Applicant notes that on page 8 of the Office Action, the Examiner asserts that the term "signal generator" may be "interpreted as the training data set for the neural network Pado et al., c7:1-4." In contrast, Pado at column 7, lines 1-4 discloses:

> If online learning is engaged, system 10 updates the neural network weights using a set of input/output data and an appropriate training algorithm. System 10 repeats the entire process for each control cycle.

As can be seen from the foregoing, the Examiner-identified portions of Pado do *__not recite__* the signal generator as recited in Independent Claim 1. Nor does this section of Pado recite even a "training data set" as asserted by the Examiner. Moreover, neither Pado nor the Examiner provide any relationship between this section of Pado and block 24.

Therefore, Applicant further respectfully points out that the Examiner has provided no evidence or reason as to why the block 24 which represents a memory should be interpreted to

teach the signal generator of Independent Claims 1, 23-25, 47-49, and 72 as the Examiner alleges.

Applicant respectfully points out that the Applicant's Application is the only objective examiner-cited document of record that shows or suggests what Examiner purports the reference to teach. From this and Pado's express recitations (see above), it follows that Examiner is interpreting Pado through the lens of Applicant's application, which is impermissible hindsight use. Thus, at present, Examiner's assertions regarding Pado are untenable.

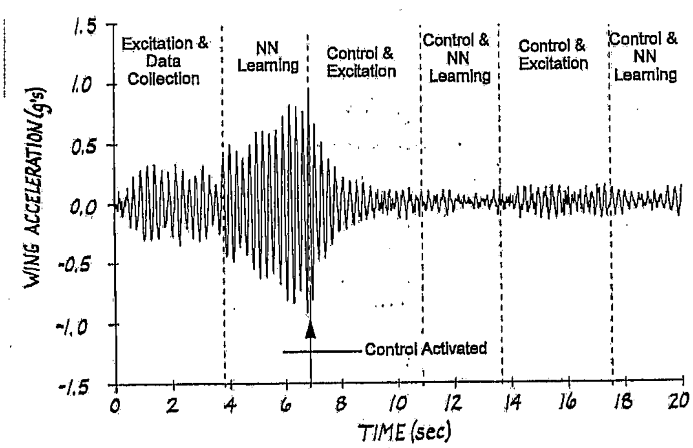
Accordingly, under MPEP standards, the Examiner has not established a *prima facie* case that art of record anticipates Independent Claims 1, 23-25, 47-49, and 72. Applicant respectfully asks Examiner to hold Independent Claim 1 allowable and to issue a Notice of Allowance of same.

Claims 3, 27, and 51 recite in part:

> wherein the control input signal comprises a sinusoidal wave which linearly increases in frequency over time.

Regarding claims 3, 27, and 51, the Office action at page 3 states "Pado anticipates the control input signal comprises a sinusoidal wave which linearly increases in frequency over time (Pado, Fig. 3; EN such is NN Learning)." Figure 3 of Pado illustrates:

FIG. 3



Pado describes Figure 3 at column 7, lines 5-25 as follows:

> According to the invention, system 10 provides predictive control simultaneously with the training of neural network 18. FIG. 3 is an exemplary plot which illustrates adaptive control of plant 12 in which training and predictive control occur together. Starting with an untrained network 18, a white noise excitation signal is sent to plant 12 for four seconds, providing 400 data points for learning by neural network 18. In this example, learning then occurs during the next 2.7 seconds, allowing control to be activated at about 6.7 seconds. As shown in FIG. 3, the plant vibration grows steadily until control system 10 initiates stabilization. Once system 10 activates its performance optimization routine 52, learning and control occur simultaneously, allowing model updates to occur every 6.7 seconds. The speed of the processor(s) 20, the control cycle rate, and the amount of data needed for accurate plant modeling determine the length of this time interval (e.g., processor 20 is embodied by a 133 MHz Pentium® processor running at 2500 Hz). The optimum settings for the level of excitation, the amount of data needed for learning, and the performance index used by the system optimization loop is plant dependent.

Figure 3 illustrates wing acceleration over time. In Figure 3, it appears that the amplitude of the wing acceleration changes over time. In fact, Figure 3 illustrates in the NN Learning section that after NN Learning begins that the 1st acceleration peak after the dotted line is higher than the 2nd acceleration peak. The 3rd acceleration peak is lower that both the 1st and 2nd peaks. Thus the wing acceleration decreases from the 1st to 3rd acceleration peaks. In fact, there are three portions of the NN Learning section where the peak wing acceleration decreases. Therefore, the amplitude of the peak wing acceleration shown in Figure 3 does not <u>linearly increases in frequency</u> over time as recited in claims 3, 27, and 51.

However, the amplitude of a signal is not the same as the signals frequency. The frequency of a signal is the number of cycles of the signal in a fixed period of time. In Figure 3, the number of acceleration cycles in a fixed period of time appears to be approximately constant. Thus, the wing acceleration <u>frequency is approximately constant</u>. Consequently, Figure 3 can

not teach "a sinusoidal wave which linearly increases in frequency over time" as recited in claims 3, 27, and 51.

For the foregoing reasons, claims 1, 3 23-25, 27, 47-49, 51, and 72 are allowable over Pado. Claims 2-22, 26-46, and 50-71 depend from claims 1, 25, and 49 respectively and are thus allowable over the cited references at least due to their dependencies on claims 1, 25, and 49 respectively.

CONCLUSION

Applicants respectfully submit pending claims 1-72 are now in condition for allowance. If there are any remaining matters that may be handled by telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

Respectfully Submitted,

Dated: 10 MAR 2008

By: [signature]

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